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— William J. Poly¹ and James E. Wetzel². ¹Department of Ichthyology, California Academy of Sciences, San Francisco, California 94118; ²Fisheries and Illinois Aquaculture Center, Southern Illinois University, Carbondale, Illinois 62901.

THE ADVERTISEMENT CALL OF *BRACHYTARSOPHRYS FEAE* (BOULENGER 1887) (ANURA: MEGOPHRYIDAE).— Little is known about the natural history or calling behavior of the five species of frogs currently placed in the genus *Brachytarsophrys* (*B. feae*, *B. carinensis*, *B. intermedius*, *B. platyparietus*, and *B. chuannanensis*). Because of their rarity, these animals have received little attention in the historical literature. In March 2002, while conducting a survey in Kachin State in northern Myanmar, we encountered and recorded chorusing *Brachytarsophrys feae*. To the best of our knowledge, to date, this is the only analyzed recording of any frog belonging to this genus to be reported in the literature.

The males of *Brachytarsophrys feae* (Fig. 1) were found in evergreen montane forest at an elevation of 1,085 m. All individuals were found under rock overhangs which formed small caves in the middle of shallow slow flowing streams. In all instances, the opening to the cave faced downstream, and the substrate was gravel or cobble. Individuals were found in regions where the stream was densely covered by canopy. The stream width was about 1.5 meters, and the banks were heavily vegetated. Five males were heard calling at one locality near Ngar War Village, Hkakabo Razi National Park, Kachin State, Myanmar (27°50'03.5"N, 97°45'40.8"E). The call of one individual (SVL 116.2 mm) was recorded at 2145 hrs. during



FIGURE 1. *Brachytarsophrys feae*, Northern Myanmar. Photo by Hla Tun.

heavy rain. The air temperature was 13°C and the stream temperature was 14°C.

Calls were recorded *in situ* by KSL using a Sony WM DC6 Professional recorder. Ambient temperature, relative humidity and general weather conditions were recorded along with microhabitat and habitat data. Individuals were collected and photographed and latitude and longitude were recorded using a Garmin 12 GPS with the datum set to WGS 84. Animals were euthanized and then fixed in 10% buffered formalin before being transferred to 70% ethanol. Specimens are deposited in the California Academy of Sciences (CAS). Calls were digitized and analyzed using Raven 1.1 software (Cornell Bioacoustics Lab) on a Macintosh G4.

Four advertisement calls were evaluated (CAS 228507). The spectrogram depicts calls consisting of four to five notes. The notes vary in the number of harmonics, from two to seven in our sample (Fig. 2C). The dominant frequency lies at 1378 Hz, with harmonics at 4134 Hz, 6890 Hz, 9646 Hz, 12403 Hz, 15159 Hz, 17915 Hz and 20671 Hz. As is evidenced by plotting frequency (in KHz) against intensity (in arbitrary units) (Fig. 2E), there is an inverse relationship between frequency and intensity, the energy of the note lying primarily in the lower frequencies. It is interesting to note that the rate of change in intensity between successive harmonics decreases. Notes also display some frequency modulation, with a small frequency dip in the fundamental frequency and lower range harmonics (Fig. 2D) at the beginning of the note.

Call duration ranged from 2.256–3.5488 s. Within a call, notes lasted between 0.34–0.474 s ($n = 18$) and occurred at intervals ranging from 0.293–0.482 s. Captured in the recording are two non-overlapping calls emitted by other individuals (Fig. 2B at 18 s and 1.40 mins). While the latter call evoked an almost immediate response (call four) from our target male (lapse time of 6 s), in the former case 34 seconds lapsed before eliciting a response (call three of our target male). Due to our

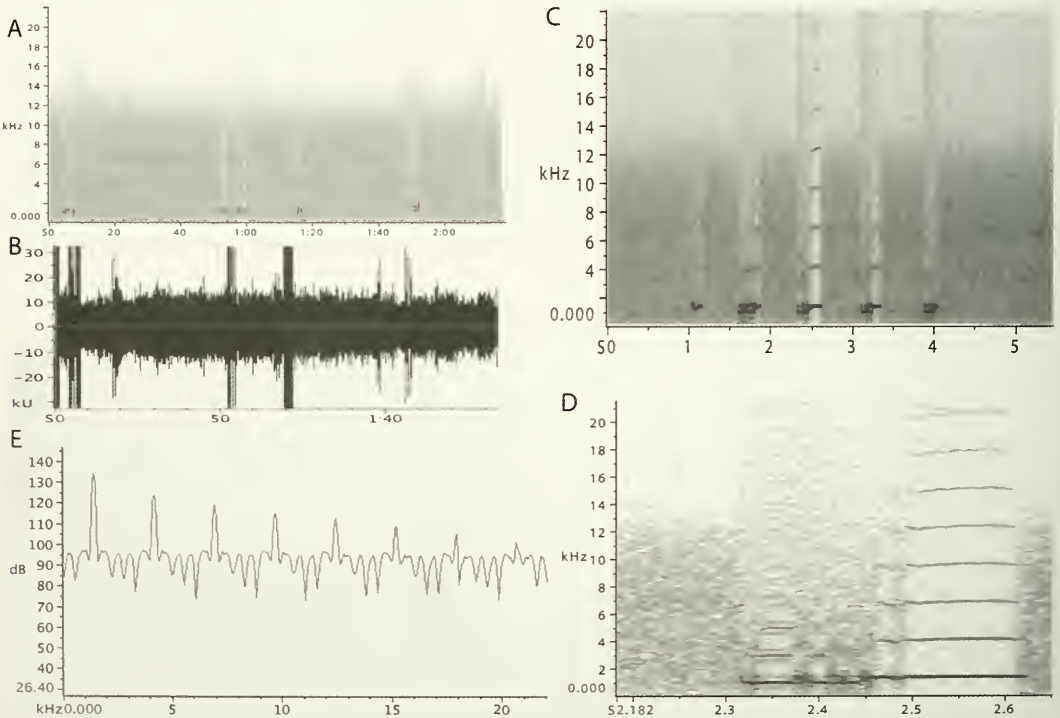


FIGURE 2. A. spectrogram of calls (time vs. frequency) B. waveform of calls (amplitude vs. time) C. spectrogram of call two (time vs. frequency) D. spectrogram of note three call two (time vs. frequency) E. power graph (frequency vs. dB).

small sample size we can not differentiate whether this is a true call-timing shift or if calls in this instance were by random chance non-overlapping. Interestingly, the first response call (call three of our target male) contained notes with seven added harmonics suggesting that *B. feae* may add additional elements to its call in response to the non-overlapping calls of their neighbors. By selectively exceeding the acoustic energy of its competitors, the male may attract females while still conserving energy (Schwartz 2001). In our limited experience with this species, chorusing was only heard during the rain. On nights when it was not raining, individuals did not even emerge from their rock burrows. The coordination of chorusing with abundant background noise may help disguise the location of the chorus from potential predators (Grant et al. 1998).

DISCUSSION.— The calls of *B. platyparietus* are unknown, and the calls of *B. feae*, *B. carinensis*, *B. intermedius*, and *B. chuannanensis* have not received much attention in the literature. Taylor (1962) characterized the call of *B. carinensis* as “introduced on a querulous note followed by a loud raucous call repeated five or six times with slight pauses between”, and Smith (1921) summed up the call of *B. intermedius* simply as “loud, harsh croakings”. Similar to Taylor’s (1962) report on the call of *B. carinensis*, and Smith’s (1921) report on the call of *B. intermedius*, the call of *B. feae* is quite loud and can be heard from a distance. Smith (1940) described the call of *B. feae* as follows “This frog had a piercing cry, not unlike a small Kloxon (horn). For each performance it filled its lungs in three distinct breaths, opened its mouth, paused a little, and then gave vent to a continuous harsh screeching until its wind had gone.” To our interpretation, the call more closely resembled barking.

The few accounts of habitat preferences consist of *B. carinensis* “ensconced among rocks in a stream” (Taylor 1962), *B. intermedius* found in “some deep crevice between the rocks or boulders of the streams” (Smith 1921), *B. chuannanensis* found in “streams usually hiding in openings in stone or mud-caves” (Fei et al. 2000), and lastly, *B. platyparietus* found under rocks along the sides of streams (Rao Ding-Qi, pers. comm.).

The only behavioral account comes from Bourret’s (1942) observation that the males of *B. carinensis* were “very irritable”. This can also be said of the males of *B. feae*. It appears that *B. feae* males are territorial and it is surmised from field observations that they defend their territory. Although no combat was witnessed, KSL noted that when the call was imitated the male would advance rapidly from his cave.

It is hoped that eventually, this call can be comparatively evaluated with those of its congeners. In light of the fact that *Brachytarsophrys* species appear to inhabit similar microhabitats, it would be informative to evaluate the call characteristics coupled with environmental factors within a phylogenetic framework.

ACKNOWLEDGEMENTS.— The authors would like to thank U Shwe Kyaw and U Khin Maung Zaw of the Nature and Wildlife Conservation Division, Myanmar Ministry of Forestry for their support. We thank Rao Ding-Qi for providing habitat data for *B. platyparietus* and translation of Chinese text. We also thank Jens Vindum and Michelle Koo for comments on this manuscript. Funding was provided by National Science Foundation grant DEB-9971861 to George Zug and the late Joe Slowinski.

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— **Guinevere O.U. Wogan¹, and Kyi Soe Lwin, Htun Win, Thin Thin, Awan Khwi Shein, and Hla Tun²**. ¹California Academy of Sciences, Golden Gate Park, San Francisco CA 94118; gwogan@calacademy.org.; ²Nature and Wildlife Conservation Division, Forest Department, Ministry of Forestry, Bayintnaung Road, West Gyogone, Insein, Yangon, Myanmar.